1,194,215

# PATENT SPECIFICATION 1,194,215

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

## Improvements in or relating to Multi-Cell Electrical Accumulators.

We, ROBERT BOSCH G.m.b.H., a German Company, of 4 ,Breitscheidstrasse, Stuttgart-W, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to multi-cell electrical accumulators.

An electrical accumulator is known in which the electrolyte fluid flows into the cells through filler openings which are located in a recess in a common filling chamber in the cover of the accumulator. The fluid level in the cells rises until the air vent openings of the individual cells are closed by floats and the orifice of the filler openings which projects into the cells is closed by the fluid level. Since no more air can then escape from the cells, further fluid is prevented from flowing into the cell. With this type of protection against over-filling, the arrangement of the inlet and air vent openings is such that the residual fluid which remains in the common filling chamber rises in the inlet openings, the fluid in the inlet openings and in the common filling chamber establishing a direct connection between the fluid in the individual cells so that the cells are galvanically short-circuited. There is therefore a considerable limitation of the service life and operational characteristics of the cells. In addition when the battery is completely full it cannot be charged, since the electrolyte fluid would then rise up in the filler openings and overflow.

An object of the invention is to provide an electrical accumulator with a common filling chamber for the electrolyte fluid for the individual cells, in which the fluid in the filling chamber cannot come into direct contact with the fluid in the cells so that there is no possibility of a galvanic short circuit between the cells, and in which there is no need for floats and similar moving parts in the cells.

According to the present invention a multi-cell electrical accumulator comprises a housing having a cover, at least one tubular vent member extending downwardly through the cover, the lower end of which member lies at a predetermined electrolyte level within the housing, and at least one fluid inlet aperture in the cover associated with each cell respectively and communicating with a common fluid reservoir, the exit of each said fluid inlet aperture within the housing being at a higher level than said lower end of the, or each, tubular vent member.

The invention will be further described, by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a cross-sectional elevation of the upper part of a multi-cell accumulator in accordance with the present invention with the cover for the common filling chammer lifted away, and

Fig. 2 is a perspective view of the accumulator of Fig. 1.

Figure 1 shows a cross-section through one cell of a six cell, 12 volt electrical accumulator, this cell being separated from the neighbouring cells by dividing walls in the accumulator housing 10 and by the cover 11. Electrode plates 12 have pole heads 13 and 13*a* which project into the cover 11 where they are connected to the pole head of the adjacent cells by pole bridges 14. The cells are filled with an electrolyte fluid 15, which emits gas when the accumulator is overcharged and which must be topped up at intervals with distilled water. For this purpose the cover 11 is provided with a filling chamber 16 which extends over all the cells and has a respective inlet opening 17 and a respective tubular air vent open-

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ing 18 for each cell. Each inlet opening 17 has an orifice 17*a* located inside the cells higher than orifice 18*a* of the tubular air vent 18, so that during the topping up operation the fluid flows from the filling chamber 16 through the inlet opening 17 into the cell as long as air is able to escape from the cell through the tubular air vent 18. Once the hydrostatic head in tubular vent 18 is equal to that above inlet 17, the passage of air is blocked and no further fluid can run in from the filling chamber 16 through the inlet 17.

The inlet opening 17 may be round with a diameter of max. 5 mm, or alternatively, as shown in Fig. 2, designed as a slot which is 1.7 mm wide and approx. 5 mm long, located in a trough shaped recess 19. As a result the inlet opening is always covered by the fluid in the filling chamber 16, so that no air can escape from the cell through this opening. In place of a single filler opening for each cell, it is also possible to provide several adjacent filler openings. The tubular air vent 18 has an inside diameter of about 14 mm, and is capable of receiving a device for measuring the specific gravity of the electrolyte.

The filling chamber 16 in the cover 11 of the accumulator has a central inflow passage 20, which extends laterally as far as one longitudinal side of the accumulator housing. The filling chamber 16 and the inflow passage 20 are covered by a removable cover cap 21 of polypropylene, which is fixed in the cover 11 by means of lateral portions 22 and segment shaped projections 23 and 24 which project from its underside. The upper portion of the tubular air vent 18 is therefore embraced by two opposite projections 23 on the inside and by two further projections 24, offset through 90° in relation to projections 23, on the outside. An end portion of the cover cap 21 located above the inflow passage 20 and having a rim 25 is capable of being angularly displaced by approximately 180° about a thin bridge portion 26 to the position it occupies in Fig. 1. In this position, the end portion of the cover cap 21 forms a means for facilitating filling of the filling chamber 16.

When introducing the electrolyte fluid 15 into the accumulator cells, the end portion of the cover cap 21 is first swivelled outwards to the position it occupies in Fig. 1 and distilled water is then introduced into the inflow passage 20 which is now exposed. The water then passes into the filling chamber 16 and flows off from here into the cells through the respective inlet apertures 17, until no further air can escape from the tubular air vent 18 as a result of the rising fluid level in the cells. The filling chamber 16 is then filled with water. The end portion of the cover cap 21 is then swivelled down again, so that the water inside it runs into the filling chamber 16 and the inflow passage 20 is closed again.

If gas is generated in the accumulator during charging or as a result of over-charging, this escapes slowly through the inlet openings 17, through which fluid then drips into the cell from the filling chamber 16 and replaces the water which has been lost.

This design for an electrical accumulator enables the intervals at which maintenance is required to be extended considerably. Galvanic short circuits between the cells are avoided by precise separation of the fluid in the cells and filling chamber.

WHAT WE CLAIM IS:—

1. A multi-cell electrical accumulator comprising a housing having a cover, at least one tubular vent member extending downwards through the cover, the lower end of which member lies at a predetermined electrolyte level within the housing, and at least one fluid inlet aperture in the cover associated with each cell respectively and communicating with a common fluid reservoir, the exit of each said fluid inlet aperture within the housing being at a higher level than said lower end of the, or each, tubular vent member.

2. An accumulator as claimed in claim 1 in which the tubular vent member has an inside diameter of about 14 mm. for receiving a hydrometer to enable the specific gravity of the electrolyte to be measured.

3. An accumulator as claimed in claim 1 or 2 in which the fluid inlet apertures are slots with a maximum width of 3 mm.

4. An accumulator as claimed in claim 1 or 2 in which the inlet openings are circular and have a maximum diameter of 5 mm.

5. An accumulator as claimed in any of claims 1 to 4 in which the fluid inlet apertures for the electrolyte fluid are arranged in a trough-shaped recess in the common filling chamber.

6. An accumulator as claimed in any of claims 1 to 5 in which, during operation of the accumulator, fluid flows from the filling chamber which is common to all the cells through said fluid inlet apertures into the cells to replace the fluid which has been used up in the cells.

7. An accumulator as claimed in any of claims 1 to 6 in which the filling chamber has an inflow passage which extends laterally to one longitudinal side of the accumulator.

8. An accumulator as claimed in claim 7 in which the filling chamber and the inflow passage are sealed at the top by a cover cap with segment-shaped projections on its underside which fit over the upper portion of the tubular vent.

9. An accumulator as claimed in claim 8 in which an end portion of the cover cap is capable of swivelling upwards over the inflow passage.

10. An accumulator as claimed in claim 9 in which the end portion of the cover cap may be swivelled outwards to form means for facilitating filling of the filling chamber.

11. A multi-cell electrical accumulator constructed, arranged and adapted to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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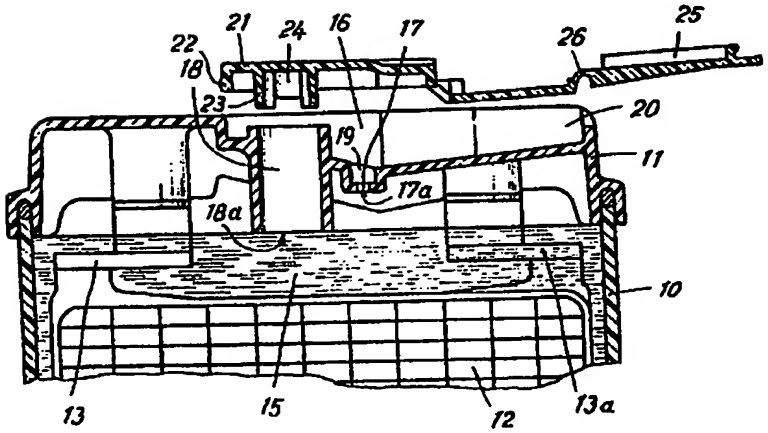
1194215 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

*Fig.1*



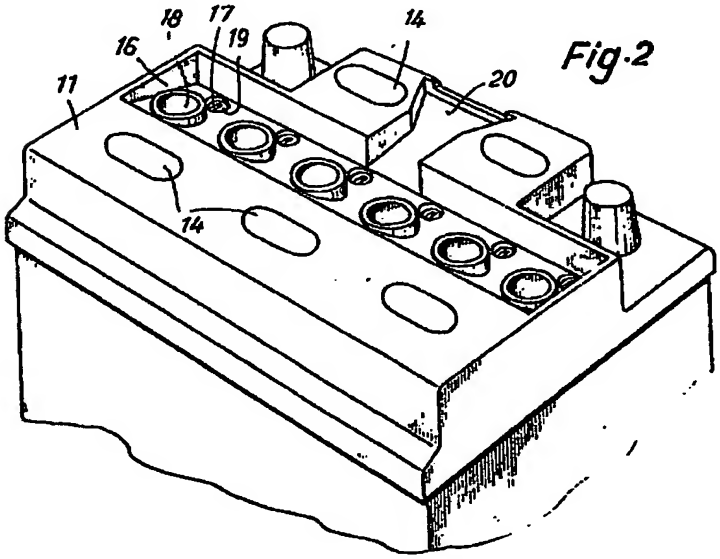




*Fig.2*